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This paper builds a system-dynamics model of the Mexican economy and tests several propositions regarding policy and income inequality. It concludes, among other things, that one of the most significant developments over the past twenty years has been the declining wage paid to those in the manufacturing export sector. As a consequence, policies aimed at increasing developing states participation in the internationalization of production have been less helpful than supposed.

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Capital Flows and Trade in Mexico: A Model of Institutional Dynamics[1]

The proper role of portfolio capital in the development process is the subject of vigorous debate. One of the core elements of the disagreement is whether or not unregulated financial markets represent a more efficient means of allocating capital (especially in terms of attracting funds to the capital scarce third world) or if in fact they add unnecessary instability to already weak economies and tend to promote policies and outcomes detrimental to the poorest members of those societies. It is the latter view, as argued by Institutionalists (especially Ilene Grabel: Grabel 1999, 1996a, 1996b, 1995a, and 1995b), that this paper will investigate.

The existing Institutionalist research is primarily theoretical or descriptive, with a handful of regression-based empirical studies. My goal is to take these approaches to a new level by combining and formalizing their insights in a system-dynamics model. In particular, the impact of deregulated capital markets on income distribution in Mexico will be highlighted. Building such a model will not only allow a more detailed and comprehensive view than results from a regression analysis, but it permits some limited experiments by altering the historical inputs. This will, I hope, provide another avenue by which the current debate may be resolved.

The paper is organized as follows. In the next section, a brief survey of the work of Institutionalist authors in this area is offered. Next, system dynamics modeling is explained. The model is then specified and some brief policy experiments are conducted. Conclusions follow.

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[1]This paper is an extension of Harvey and Klopfenstein 2001. For comparison, the model in the earlier paper included twenty variables, while the current one has forty-two. In addition, due to space constraints, the earlier paper made no effort to explain the process by which the parameter estimates were made, and thus none of the regression results were reported.

1. Mexico and the Institutionalist View of Economic Development: A Brief Introduction

One of the primary insights of the Institutionalist approach is that economic progress is a function of the degree of social reliance on instrumental versus ceremonial valuing in guiding behavior. The former provides "the standards of judgment by which tools and skills are employed in the application of evidentially warranted knowledge to the problem-solving processes of the community" (Bush 1987, pp.1080). Activities sanctioned by instrumentality are those aimed at enhancing and extending the life processes of the general population.[2] The latter offers justification "for invidious distinctions, which prescribe status, differential privileges, and master-servant relationships" (Bush 1987, pp.1079). Ceremonially-driven societies tend to suppress technological advances in favor of tradition and privilege. The argument goes that all social institutions fall into one or the other category, and that those wherein instrumentality plays the greater role are the ones most likely to generate socially useful outcomes.

Many Institutionalist authors have applied this tool to their analyses of economic development. Though it is difficult to generalize given the range of histories, cultures, et cetera, there is nevertheless widespread evidence that developing economies are marked by a variety of forms and manifestations of ceremonial valuing and invidious distinction. To offer a quick example, Dilmus James demonstrates that the context in which technology is adopted in developing states is marked by "political myopia, inadequate incentive structures, and misguided

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[2]Note that this is strikingly similar to what all economists, whether they be neoclassical, Austrian, Marxist, Post Keynesian, or whatever, set forth as **the** goal for economic activity. A key difference is that Institutionalists do not believe that the extent to which a society utilizes markets is a key question in this context. One can have a market-driven economy in a society that is dominated by instrumentality **or** ceremony.

attitudes" (James 1995, p.155). Rather than technology being a locus for community problem solving, it has been perverted into a form of international conspicuous consumption for the benefit of the local elites. Scientific equipment is acquired, for example, not because it is appropriate to address a particular domestic concern, but for the status it bestows on the institution where it will be housed. Land tenure in developing nations is another issue that has been highlighted by Institutionalists (among others) as tending to promote class barriers over social provisioning (and, therefore, ceremony over instrumentality). Ethnic strife, such a hallmark of so many nations' struggles, fits these characterizations as well.

That Mexico suffers from all these problems is hardly a shocking revelation. Little real attention is paid to developing technology, income distributions are grossly uneven, and the caste system introduced by the colonial government still serves to separate the "haves" from the "have nots" (Cockcroft 1998). Economic activity is marked not by entrepreneurial attempts to meet the demands of the common citizen, but instability, status seeking, and, on occasion, violence. Development in Mexico will require something much more fundamental than high rates of GDP growth and moderate price inflation.

However, the focus of this paper is not so much these "indigenous" forms of ceremonial valuing. Many Institutionalists would argue that the market mythology of the West has impressed itself upon the developing world and served to further strengthen the grip of elitism and status seeking. The spread of Western commercialism has taken place both via the insistence of public and private international organizations (e.g., World Bank, IMF, and Citibank) and

through the voluntary (and self serving) adoption of those philosophies by local elites.[3]

The most recent popular trend among developing economies has been liberalization of capital markets as a means of attracting funds for development. Grabel writes that the policy makers of developing states prefer this option over borrowing from public international agencies because:

> Inflows of portfolio investment are seen to reflect investor confidence in the ambitious programs of free-market reform implemented in many countries. Inflows are also seen to be an important source of investment finance in capital-scarce economies. Perhaps most appealing about portfolio investment is that it seems to be free of the kinds of constraints on national policy sovereignty that have traditionally been associated with direct investment, commercial bank loans, or foreign aid flows (Grabel 1999, p.229).

But, of course, there **are** de facto constraints on national policy sovereignty. At the most basic level, developing states must create an atmosphere that appeals to international investors. While from the neoclassical perspective, this constraint might appear to be a perfectly reasonable and, in fact, useful check on the economies of the third world, Grabel disagrees. Not only, she argues, will the dependence on the volatile international portfolio capital market add another level of instability to the developing economy, but the constraints imposed–tight monetary

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[3]As suggested in footnote one, Institutionalists do not view markets as good or bad, per se. Markets are simply a reflection of the rest of the culture. As such, they can operate to solidify the positions of elite classes over the peasantry, or as a catalyst for the marketing of safer and more efficient household consumables. Which is undertaken is a function of the structure of the society in question–which in the case of the developing world is likely to be ceremonial. Hence Institutionalists' hesitation to cheer the spread of free-market capitalism to the South.

policy, privatization, high currency values, political repression, and low wages, for example–tend to contract economic activity and increase income inequality (Grabel 1999, pp.231-233). Hence, the cure may be worse than the disease.

The latter is precisely what this paper will investigate. On the one hand, portfolio capital flows **do** bring needed funding. They serve to make available cash for private-sector activity, government spending, and imports of needed technologies and raw materials. Ceteris paribus, that cannot be a bad thing. However, Grabel (and other Institutionalists) argues that any benefit that may be had from flows of short-term capital is more than offset by what is necessary to attract it in the first place and the instability it then adds to an economy whose orientation is already decidedly not instrumental in nature. I intend to build a small model of the Mexican economy and put Grabel's contention to the test.

2. System Dynamics Modeling

> In an appendix to **An American Dilemma**, Gunnar Myrdal writes:
>
> Ideally, the scientific solution of the Negro problem should thus be given in the form of an interconnected series of quantitative equations, describing the movement of the actual system under various influences. That this complete, quantitative and truly scientific solution is far beyond the horizon does not need to be pointed out. But in principle it is possible to execute, and it remains as the scientific ideal steering our endeavors [Myrdal 1944, p.1069].

Needless to say, the era of computer technology means that Myrdal's "scientific ideal" is now a realistic possibility. This is precisely the point Michael J. Radzicki makes in arguing for

"Institutional Dynamics," or a marriage of the parallel worlds of Institutionalism and system dynamics computer modeling (Radzicki 1988). The great virtue of this method is its ability to take into account the holistic, systemic, and evolutionary character of economic activity and to allow the researcher to capture the effects of qualitative as well as quantitative variables. It shows the operation of systems that exist in time and that are marked by feedback and cumulative causation. It further forces the researcher to add structure and substance to analyses that might otherwise become "loose, uncontrolled speculation" (Wilber and Harrison 1978).

Employing system dynamics involves specifying the mathematical relationships among the various objects deemed to be part of the system under study. Some variables are determined exogenously (as decided by the researcher), while others are created by the operation of the model. Based heavily on the work of Jay Forrester (see Radzicki 1988 for an extensive Forrester bibliography), another expectation of those working with this method is that social systems tend to be marked by feedback. This, too, must be reflected in the model. A number of software packages have been designed for system dynamics modeling. The model in this paper was built using Powersim.

3. Modeling the Mexican Economy

3.1 Basic considerations

Radzicki and Sterman write that, above and beyond the final product itself (which can never truly be *final*, given the evolutionary premises of the approach), the *process* of building a system dynamics model is incredibly instructive and educational (Radzicki and Sterman, 1994). I can add my enthusiastic voice to theirs in this regard. The model specification process was

indeed enlightening, not to mention terribly tedious! The reader is spared much of the detail in this regard, though justifications are offered where appropriate.

The first step was to determine the identity of the ultimate dependent variable. Given the Institutionalist approach to development, it clearly had to be some measure of the ceremonial/instrumental dichotomy. Based on Elliott and Harvey (2000), it was determined that income inequality could serve as a proxy as it tends to be highly correlated (as both cause and effect) with ceremonial activities like invidious distinction and conspicuous consumption. In practice, I used the Theil statistic (which rises as inequality increases) as created by the **University of Texas Inequality Project** .[4] The great advantage of using their data was that they were available over a much longer time period and with greater frequency than more standard measures of inequality.

As one of the goals was to simulate a-historical policy packages, the next decision concerned which variables should be manipulated in this regard. Monetary and fiscal stances were obvious choices. I also hoped to show the impact of varying the minimum wage, exchange rate, and market liberalization policies. Precisely how each was modeled will be explained later.

With these variables identified, it remained to determine what economic processes connected them. My solution to this problem was informed by Post Keynesian macroeconomic theory (though no works in particular). The Post Keynesian approach is distinguished by, among other things, the belief that agents make decisions in an environment of uncertainty and that economic processes are best understood as existing in historical rather than mechanical time.

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[4]The **University of Texas Inequality Project** makes available both their data and a series of excellent papers (most featuring James K. Galbraith as a co-author) on their web site: http://utip.gov.utexas.edu/. I are grateful to them for their kindness in forwarding these data.

The latter makes for an excellent fit with system dynamics, while the importance of the former is in its implied rejection of Say's Law and the consequent importance of financial markets in playing significant role in determining "real" variables in the macroeconomy.

My final consideration was the detail with which I would model the processes between income distribution and the policy variables. My rule of thumb was to aim for simplicity while highlighting those sub sectors in which I were particularly interested, i.e., portfolio capital flows and the financial sector.

3.2 Estimating the model

While the final specification of a system dynamics model is the result of comparing the plot of the endogenous variables (assuming the input of historical values for the exogenous variables) with their historical counterparts and making adjustments to the parameters until divergence is minimized, one must have an initial estimate with which to work. To that end, I ran a series of regressions based on my understanding of the operation of the Mexican macroeconomy. The study is quarterly 1980:2 through 1998:4 (both the endpoints and frequency were dictated by data constraints).

The construction of the variables discussed hereafter should be evident from Table One except for DFiscStim.[5] Because the government budget is as much determined by as it is a determinant of economic activity, one cannot simply use the balance as evidence of fiscal policy. I attempted to net out of the raw numbers that part of the budget *resulting from* economic

[5]Unless otherwise noted, all data were taken from the Bank of Mexico web site (http://www.banxico.org.mx/) or that of the Federal Reserve Bank of Saint Louis FRED database (http://www.stls.frb.org/fred/index.html).

fluctuations (leaving the discretionary, or FiscStim; DSiscStim is the first difference). To do this, two regressions were run, one with government revenues dependent and industrial production (a proxy for economic activity) independent and one with government spending dependent and

TABLE ONE: Variable Definitions and Sources (quarterly data from 1980:2 through 1998:4; all are for Mexico unless otherwise noted).

Variable	Definition and Source (all Bank of Mexico unless noted)
Austerity	Dummy to represent the introduction of de la Madrid's austerity program. Takes a value of one for 1983:1. Source: Author.
ChinaMRatio	Ratio representing China's share in total US imports. Source: Author's calculation using data from FRED database and U.S. International Trade Commission.
Const	Index of construction activity (1993=100). DConst is first difference.
CVFX	The monthly coefficient of variation of the monthly peso/$ exchange rate over the current quarter.
DFI	Net direct foreign investment (1000's of 1980 pesos). It is first difference of DFK.
DFK	Accumulated net direct foreign investment (1000's of 1980 pesos). Source: Author's calculation based on DFI numbers. Source: Author's calculation.
Exports	Exports, 1000's of 1980 pesos. DExports is first difference.
FinLib	Dummy variable for government policy with respect to financial markets (default value of zero; add one for privatized banking system (every quarter but 1982:4 through 1991:3), one for deregulation involving credit rationing (1988:4 and thereafter), and one for legislative efforts to make Mexican capital available to foreigners (1989:4)). Source: Author.
FiscStim	The full employment budget surplus in millions of real pesos (equal to seasonally-adjusted government spending minus government revenues plus 1.107 times IndProd). Source: Author's calculations based on data from Bank of Mexico. DFiscStim is first difference.
FX	New Pesos per dollar. DFX is first difference.
IndProd	Index of industrial production (1993=100). DIndProd is first difference.
Inf	Consumer Price Inflation; DInf is first difference (note the latter also appears in the Powersim model as D_Inf).
Int	The nominal average cost of bank deposits. DInt is the first difference.
LoanDefault	Dummy to represent the announcement of Mexico's loan default. Takes a value of one for 1982:3. Source: Author.
ManuWage	Manufacturing wage index (1985=100, deflated using CPI). DManuWage is the first difference.
MinWage	The minimum wage rate index (1978=100, deflated by CPI). DMinWage is the first difference. MinWagePolicy is simply DMinWage–the latter could not be directly entered into the model given Powersim's restrictions.

Overval	Overvaluation of the peso. Based on purchasing power parity, it is calculated by subracting the excess of Mexican inflation over US (CPI figures for both) from the quarter's depreciation of the peso. Source: Author's calculation using data from Bank of Mexico and FRED database.
Pacto	Dummy for the economic pact among government, labor, and business. Takes a value of one for 1988:2 through 1994:4. DPacto is first difference. Source: Author.
PFI	Net portfolio foreign investment (1000's of 1980 pesos). It is the first difference of PFK.
PFK	Portfolio capital investment (1000's of 1980 pesos; accumulated net PFI). Source: Author's calculation based on PFI numbers.
Quake	Dummy variable for 1985 earthquake (takes value of 0 except for 1985:4 through 1986:3). Source: Author.
RealInt	The real (CPI deflated) average cost of bank deposits. DRealInt is the first difference. Note that in the model presented RealInt acts only as a proxy for exogenous monetary policy.
RealOil	Real dollar price of oil per barrel, measured in cents (1982-84 dollars). DRealOil is first difference. Source: Author's calculation using data from FRED database and U.S. Engergy Information Administration, Department of Energy.
Theil	Measures the variance of manufacturing wages and ranges from 0.004136 to 0.018691 (where higher indicates greater inequality). Source: University of Texas Inequality Project.
TradeLib	Dummy to represent trade liberalization policies. Takes a value of one for 1988:1 through 1998:4. Source: Author.
USECI	US Employment Cost Index. DUSECI is first difference. Source: U.S. Bureau of Labor.
USGDP	US GDP, seasonally adjusted, billions of 1996 dollars. DUSGDP is first difference. Source: Federal Reserve Bank of St. Louis.
USInf	US Consumer Price Inflation. Source: FRED database.
USInt	US Fed Funds Rate adjusted for inflation (using CPI). Source: FRED database.
XIndex	Variable proxying the importance of the foreign trade sector to the economy. Measured as the ratio of exports (1000's of 1980 pesos) to industrial production (1993=100). Source: Author's calculation using Bank of Mexico data.

industrial production independent (monthly 1980 through 1998; because I was less limited, I used a longer time period and more frequent observations in the hope that this would result in a more accurate estimate). Those results are shown below (the technique is ordginary least squares; parenthetical numbers are absolute values of t-statistics; these conventions are followed through the rest of the paper):

(1) Spending = 186 - .838IndProd (9.38) adj-R^2 = 0.28

(2) Revenue = 14 + .269IndProd (10.00) adj-R^2 = 0.31

Spending and Revenue were drawn from the Bank of Mexico web site and were measured in millions of 1980 pesos, and IndProd was as shown in Table 1. As expected, government spending declines in response to rises in economic activity, while revenues increase.

To remove the cyclical component from the government's excess of spending over revenue, the following calculation was made:

FiscStim = (Spending - Revenue) - (-0.838IndProd) + 0.269IndProd, or,

FiscStim = (Spending - Revenue) + 1.107IndProd

where FiscStim is the adjusted fiscal stimulus.[6]

Estimation then began with the ultimate dependent variable: Theil (recall that the Theil will rise as inequality increases). I theorized that it would be a function of the overall level of manufacturing wages (a hypothesis consistent with the findings of Galbraith, Conceição, and Kum (2000)), the 1985 earthquake, and the Mexican government's financial market

[6]Note that the intercepts of the estimated equations were not used in the calculation. This was both because intercept estimates are not terribly reliable and FiscStim actually employed in the differenced form, DFiscStim. Hence, the constants would be irrelevant.

liberalization policy. The following equation was estimated:

(3) Theil = 0.024375 - 0.001848ManuWage + 0.002675FinLib + 0.001247Quake
(14.04) (18.11) (1.45)
adj-R^2 = 0.86

As expected, rising wages was associated with declining income inequality, while the earthquake and market liberalization led to increases. The last is included here on the assumption that (as Grabel argues) simultaneous with moves to make it easier for foreigners to enter their capital market, the Mexican government adopted labor policies that were likely to be attractive to foreign investors and that would not have already been reflected in wages. All variables were significant at the ten-percent level.

Moving backwards from here, as both FinLib and Quake are exogenous this leaves only ManuWage to explain. Here, I assumed the primary determinants of wages would be the level of economic activity (IndProd), the minimum wage (MinWage; it is an especially important benchmark in the Mexican economy), the pact made among workers, government, and labor (Pacto), the de la Madrid austerity program (Austerity), and the changing structure of employment. To capture the latter I used two interaction terms. The first, DFK*TradeLib, hypothesizes that the open courting of foreign direct capital associated with the liberalization policies that began around 1988 led to rising wages for those Mexicans employed by foreign multinationals (through the Maquiladoras, for example). The second, Xindex*TradeLib, draws on the results of the 2002 UNCTAD Trade and Development Report (UNCTAD 2002), wherein it is argued that developing nations experiencing growing export sectors witness a decline in overall wages. This is so, they suggest, because it appears that the exports that grow tend overwhelmingly to be those involved with labor-intensive manufactures, often as a single stage

of an internationalized production process. Not only does this already tend to be a low-wage occupation, developing states are increasingly competing for this business and thereby managine to drive wages even lower.

(4) DManuWage = -0.038 + 0.055DIndProd + 0.248*Pacto +
(1.92) (3.03)

.00000039(DFK*TradeLib) + 0.029DMinWage(-1) -
(1.56) (4.79)

5.45(XIndex*TradeLib) - 0.766*Austerity
(1.95) (2.27)

adj-R^2 = 0.41

All variables were signficant at the ten-percent level.

Three of the determinants in equation (4) are endogenous: IndProd, DFK, and XIndex. Dealing initially with the first, it was easier to explain differences in IndProd than the level (the latter can then be built from the successive changes–this is simple to do in Powersim). In specifying equation (5), I assumed as my base a standard demand-driven macroeconomic model in which economic activity is a function of the autonomous spending associated with the fiscal stimulus (DFiscStim), private investment (for which I used construction activity as a proxy: Dconst), and exports (Dexports). I further decided, not only here but in the rest of the model, to measure all non-financial variables in real terms. This does not imply, however, that I assume money to be a veil in my system. Rather, monetary factors are vitally important and will tend to spur additional economic activity when financial markets are stable and dampen it when they are volatile. As stock market figures were available for only a small subset of my time series I opted to use the monthly coefficient of variation of the peso-dollar exchange rate over the current

quarter (CVFX) as a proxy for financial market volatility and to then include this directly in the regression. This yielded the estimate below:

(5) DIndProd = 0.268182 + 0.064DFiscStim + 0.302DConst + 0.936DExports - 4.57CVFX
(3.96) (4.81) (2.64) (1.73)

adj-R^2 = 0.47

Again, all variables were signficant at the ten-percent level.

DFI was estimated using equation (6) (which can then be used to create DFK). Unlike domestic physical investment DFI is less likely to depend on local financing and thus not need high levels of PFI or low interest rates. Since so much Mexican DFI comes from the United States, I included changes in U.S. GDP (since, from a vertical DFI perspective, U.S. firms may be expected to be expanding when their economy is booming; horizontal DFI may also be positively correlated with U.S. GDP since a rise in the latter is likely to create a locomotive effect with respect to the Mexican economy). Second, I include DFX, since a falling peso would be attractive to U.S. firms. Third, I assumed that government attitudes toward market liberalization (especially as it affects rules governing foreign ownership) would play an important role. Finally, Mexican wages are bound to have an impact on the DFI decision. My result is shown below:

(6) DFI = 8063 + 54.7DUSGDP + 4980FinLib(-1) + 9914DFX(-1) - 3499DManuWage(-1)
(2.10) (5.39) (2.65) (1.22)

adj-R^2 = 0.41

All variables are significant at the ten-percent level. Note that three of the variables are lagged one period, as indicated by the "(-1)" (a (-2) represents a two-quarter lag, and so on). This and all subsequent lags were a function of empirical fit rather than theory alone.

The last remaining endogenous variable from equation (4) is XIndex, the ratio of exports to industrial production in Mexico. As the latter has already been explained, it remains to specify the former, which I do in (7) (which shows change rather than level; again, the latter is easily constructed from the former in Powersim):

(7) DExports = 0.42 + 0.76DFX - 0.403(Inf(-1)-USInf(-1)) +
(8.05) (3.03)

0.148DUSECI(-1) - 0.0436DManuWage(-2) - 0.110TradeLib +
(1.55) (1.41) (1.38)

0.000144DRealOil - 35.41(ChinaMRatio) + 0.8443*(DUSGDP/USGDP)
(1.07) (1.60) (0.18)

adj-R^2 = 0.50

This one became rather complex, with eight determinants. To take account of price factors I included both DFX and the difference between U.S. and Mexican inflation. I then took separate account of the difference between U.S. and Mexican wages with USECI and DManuWage. The regression was rounded out with variables representing Mexican relaxation of trade restrictions (TradeLib), the price of oil (on which Mexican export revenues had been dependent), U.S. GDP growth (as an income variable), and the ratio of U.S. imports from China. I added the last to take into account the fact that in the latter part of the time period under study the U.S. began to import more and more low-cost goods from China, rather than traditional sources like Mexico. All variables were significant at the ten-percent level except oil prices and U.S. GDP growth.

Left unexplained from equation (5) are DConst and CVFX. Dealing with the latter first, I hypothesized that volatility was in part a positive function of the level of foreign portfolio capital investment in Mexico (PFK) and of price inflation (Inf). The latter would contribute rather

directly to financial instability as it forces re-evaluation of asset prices, while the former, as it rises, increases the level of speculative activity in the market. On the other hand, increasing industrial activity is likely to promote stability. Exchange rate overvaluation (measured by Overval, which I found worked better when squared–a result that is also intuitively appealing) and the announcement of Mexico's default in 1982 were also assumed to affect exchange rate volatility. I estimated the below (all variables significant at the ten-percent level):

(8) $CVFX = -0.095 - \underset{(1.83)}{0.0059}DIndProd(-1) + \underset{(1.15)}{.0000000142}PFK +$

$\underset{(4.70)}{0.154}Inf + \underset{(2.96)}{0.0989}Overval^2 + \underset{(2.28)}{0.087}LoanDefault$

$adj\text{-}R^2 = 0.35$

Modeling construction activity proved somewhat more complicated. I assumed that interest rates (nominal) would be an important consideration, along with foreign portfolio investment (which should make availability of funds greater) and foreign direct investment (which will directly contribute to construction in many cases). The trickiest problem, however, was determining a variable that could be used to proxy market confidence (something akin to Keynes' marginal efficiency of capital). Though I found no such direct measure in existence, I wase able to use the change in the peso-dollar exchange rate and its volatility as proxies (the logic being that a strong peso and low volatility, i.e., falling or small values for DFX and CVFX, would suggest a sound Mexican economy in which to invest). I also added DFiscStim to represent the Mexican government's impact on investment spending, assuming that some of the activity would have been construction. The following regression was estimated:

(9) DConst = 0.607 + .0000196PFI(-1) - 0.076DInt(-1) - 4.65DFX +
(1.49) (1.57) (2.73)

.0000278DFI + 0.23DFiscStim - 22.27CVFX
(0.69) (5.05) (2.08)

adj-R^2 = 0.40

All variables were significant at the ten-percent level except DFI.

Equations (8) and (9) contain six endogenous variables (DIndProd, PFK, Inf, PFI, DInt, and DFI), one of which has already been explained (DIndProd, in equation (5)). PFK is defined in the dynamic model simply as an initial value plus PFI. Thus, it is only the latter that must be explained here. I theorized that foreign portfolio investment would be driven by four major factors: government liberalization policies (FinLib), financial market volatility (CVFX), the proxy for confidence (DFX; recall that a positive value indicates declining confidence), the excess interest return available on Mexican assets, the Pacto, and industrial production. I expected FinLib to be positively related as the international investment community would interpret liberalization in a positive light (squaring the term gave a better result); CVFX to be negative, as financial instability caused capital flight; DFX to be negative, as peso depreciations would also lead to capital flight; the excess return on Mexican assets to be positive; the Pacto to be positive as it helped drastically reduce inflation and encourage foreign confidence in the Mexican economy; and industrial production to be positive as it indicated a stronger Mexico. Equation (10) shows the results:

(10) PFI = -2657 + 4097FinLib^2 - 149181CVFX - 63913DFX + 175(Int-USInt) +
(3.62) (1.89) (5.27) (0.95)

12972Pacto + 4916DIndProd
(1.66) (1.95)

adj-R^2 = 0.88

All are significant with the exception of Interest-USInterest, which does have the correct sign.

Like PFK, inflation is defined in the dynamic model as an initial value plus cumulative changes. The latter is expressed as DInf, or the rate of change of the CPI differenced over quarters. Assuming both a cost-push and policy element to inflation in Mexico, I modeled it as a function of wages (ManuWage) and the change in real interest rates (DrealInt; this variable enters into the model only as a proxy Mexican central bank policy and is therefore exogenous and not a function of any internal processes). In addition, Pacto was clearly an important policy determinant of inflation, and the rate of peso depreciation (DFX/FX) would contribute to higher prices. All variables were significant at the ten-percent level:

(11) DInf = -0.089 + 0.0066ManuWage - 0.0083DRealInt + 0.511(DFX/FX) - 0.634DPacto -
(1.41) (13.80) (6.69) (10.66)

adj-R^2 = 0.88

Changes in nominal interest were assumed to be a function of domestic inflation and inflows of foreign investment (with the former expected to raise nominal interest and the latter to lower it):

(12) DInt = 0.379254 - .0000171PFI + 43.55742DInf
(0.78) (8.00)

adj-R^2 = 0.48

DInf is significant; PFI is not, but the coefficient has the correct sign.

Finally, peso overvaluation was calculated as follows (based on the purchasing power parity equation):

(13) Overval = DFX/FX-Inf+USInf.

3.3 Finalizing the system dynamics model

The first Powersim model consisted of equations (3) through (13). Further tweaking of the relationships then took place. In general, because I found that the real world tended to be more unstable than my model, a few intercepts had to be shifted and more volatility was added. Also, a frequent problem during final specification was the explosiveness caused by the numerous feedback effects. Altering a variable coefficient by only a small amount sometimes led to surprisingly large cumulative changes in the model. Many of these took considerable time to trace and solve.

In the end, the model consisted of forty-two variables (eighteen exogenous and twenty-four endogenous, including eight sets of flows into stocks) and eleven equations (excluding the stock-flow relationships), using quarterly observations. The core relationships are defined in Appendix One. These combine to create the system shown in Diagram One.

As suggested above, the first test of any such model is how well recreates the past. Diagram Two shows the result of inputting historical values for the exogenous variables. It appears to have a reasonable fit over the time period.

The next step is to posit ahistorical policy choices and then compare that Theil plot with

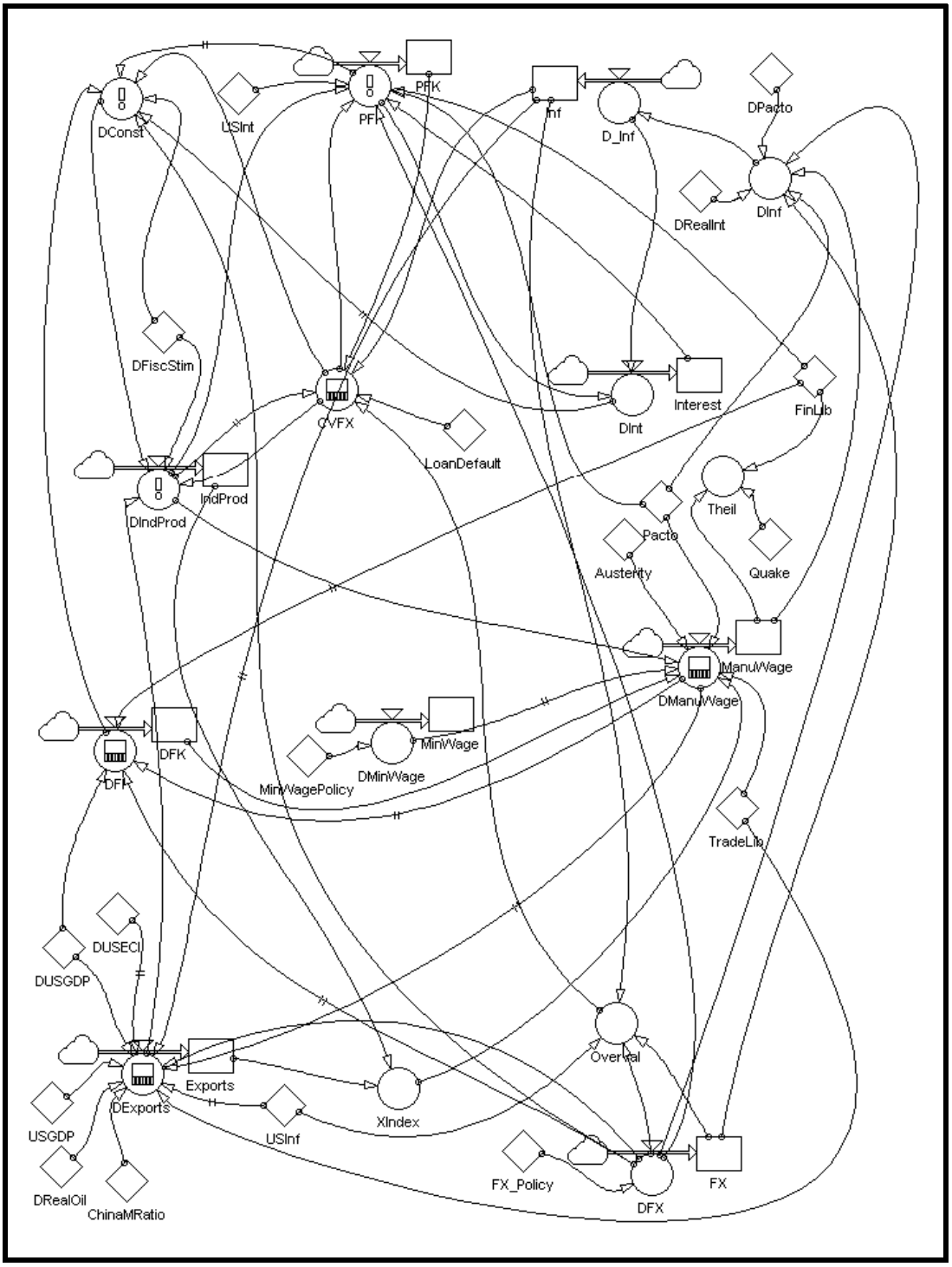

Diagram 1: Complete Powersim Model.

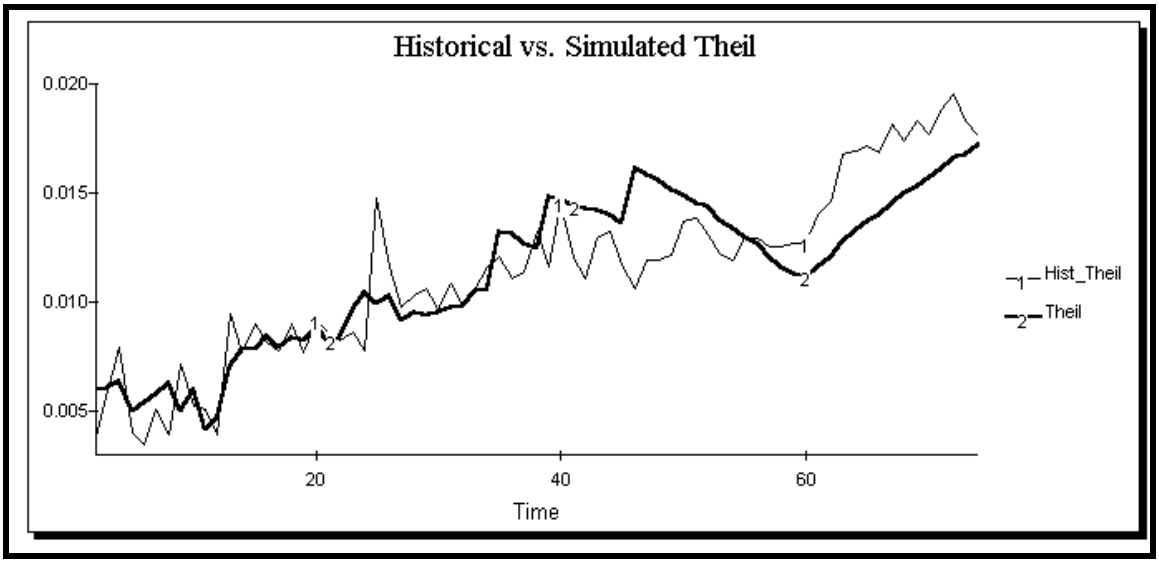

Diagram 2: The model simulation (Theil) versus the historical plot (Hist_Theil).

the original forecast.[7] This is done in below, where alternate minimum wage, monetary policy, and fiscal policy, and capital market and trade liberalization policy regimes are explored. Interestingly, the story told by Grabel is only partially supported.

Before beginning the series of policy experiments, it should be said that one has to be very careful changing the values too far from their historical levels. While a dynamic model such as that presented here is better equipped to adapt to a-historical scenarios, it is still ultimately limited by the fact that it was built by comparing simulation results to *actual events* in 1980 to 1998 Mexico. Hence, suddenly quintupling the fiscal policy stimulus would not only be difficult to justify in terms of financing, but it would lie so far beyond the range of the data used to build the model that any results would be suspect. Nevertheless, it **is** desirable to try combinations that

[7]That is, all comparisons of a-historical plots are made against the simulation shown in Diagram One, not against the historical Theil.

did not occur in reality; but the researcher must try to limit the experiments to situations that might have been possible in reality, and both reader and researcher must be careful in interpreting subsequent plots.

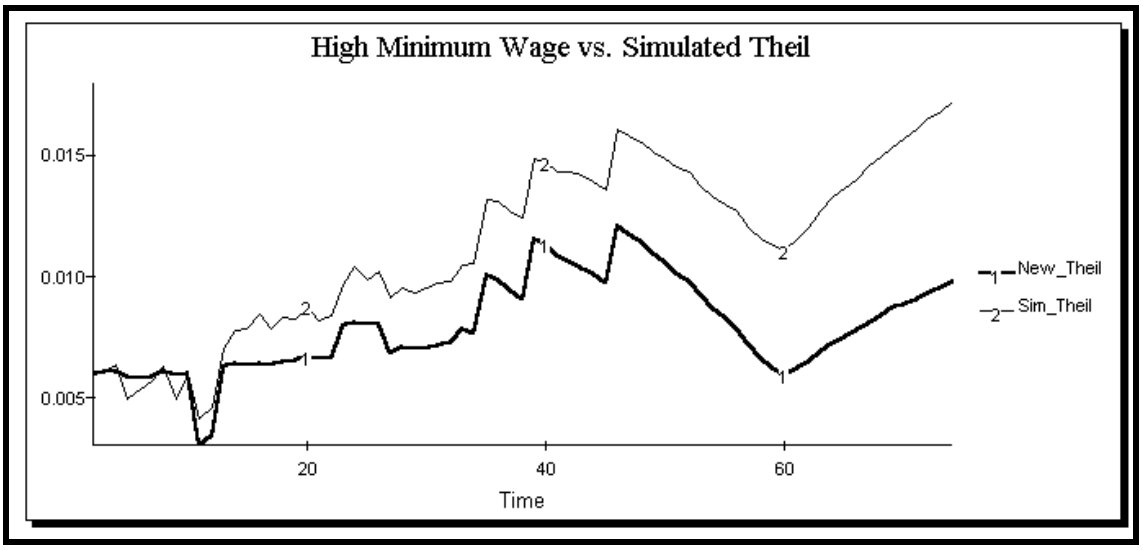

Diagram 3: The impact of higher minimum wages (New_Theil) versus the simulation using historical wage values (Sim_Theil).

Diagram Three shows the impact of holding the minimum wage at the 1980:2 level (the first observation; in reality it fell, in real terms, rather steadily from an index value of 126 in 1980:2 to 38 in 1998:4). The result is striking. Though the Theil is still higher than it was at the beginning of the time period, it is a vast improvement over the simulation in which the minimum wage is allowed to collapse. Of course, part of the reason is the fact that the minimum wage impacts on the manufacturing wage, which, feeds directly into the Theil. Higher wages decrease income inequality. But there are negative effects, too. Higher wages lead to higher inflation and greater financial market instability (via CVFX). Still, this appears to be minor. Inflation averages 41% when the minimum wage is not allowed to fall, as opposed to 32% when it is.

Apparently, that is insufficient to cause a significant decline in industrial production (which would have then lowered wages). Interestingly, foreign direct investment is completely unaffected, so the higher wages do not seem to discourage multinationals. Exports do fall, but this turns out to be a positive since it lowers the export ratio (and hence employment in the increasingly low-wage export sector).

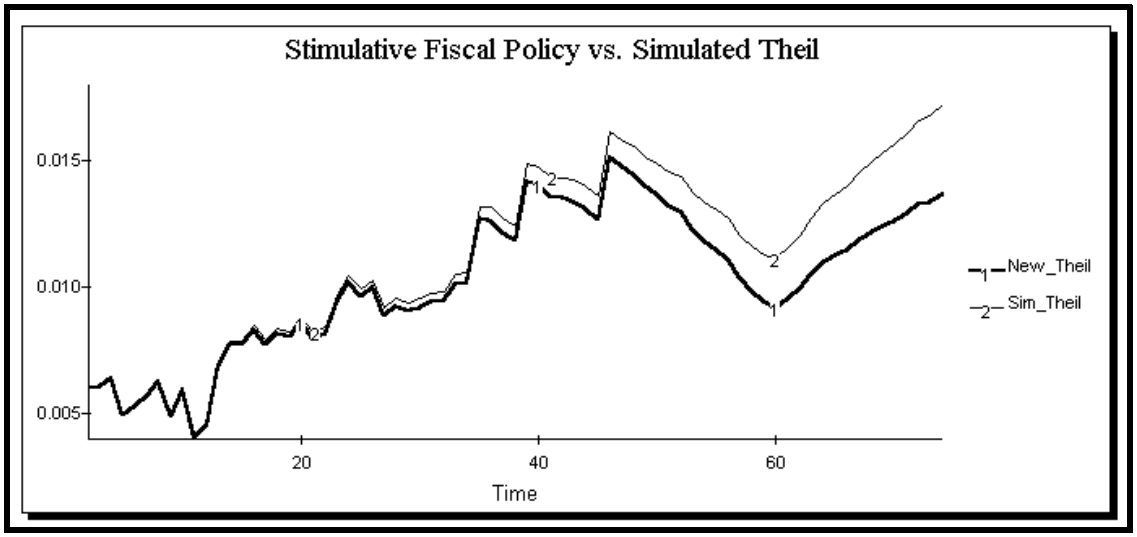

Diagram 4: The impact of 100% greater fiscal stimulus (New_Theil) versus the simulation using historical fiscal policy values (Sim_Theil).

Diagram 4 posits a fiscal policy stance 100% more expansionary than in reality. The reader might rightfully object that it is difficult to imagine Mexico being able to finance such a deficit; however, my only goal in showing this level is to make it plain how little help a traditional macro stimulus is under such circumstances.[8] The difference can be traced to the fact that the XIndex does not rise as rapidly as it did in reality (due to the inflation created by the

[8]This differs from the previous scenario in that minimum wages were not set to levels that had never been experienced–they simply were not changed.

higher wages), thus helping overall income equality. But again, the real lesson here is that fiscal policy changes (at least in terms of the general level of spending) would not be helpful to Mexico.

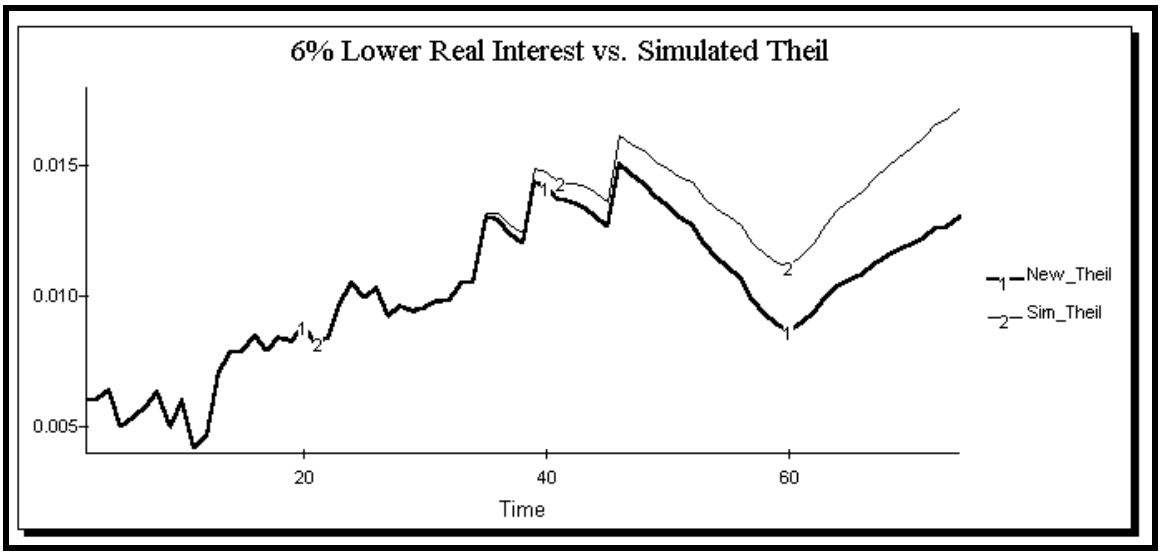

Diagram 5: The impact of 6% lower real interest rates (New_Theil) versus the simulation using historical real interest rate values (Sim_Theil).

Nor can much be achieved by monetary policy, as shown in Diagram 5. This shows a six percent lower real interest rate (which averaged 4.5%, but ranged from 34.6% to -41.0% over the period studied), which represents a pretty significant effort on the part of the Mexican central bank. Again, the plot appears to be attributable to lower exports. As with fiscal policy, the overall impact on income inequality is rather small given the exertion necessary.

Diagram 6 takes us finally to the question at hand: does capital market liberalization hurt more than it helps? The answer for Mexico is very interesting. At first the no-capital-liberalization Theil is superior (1980:2 through 1982:4, or observations 1 through 11). After that, it is practically (though not exactly) identical to the historically-based simulation until 1989:1

(observation 36), when it again falls below the latter. Thus far, this would not be inconsistent

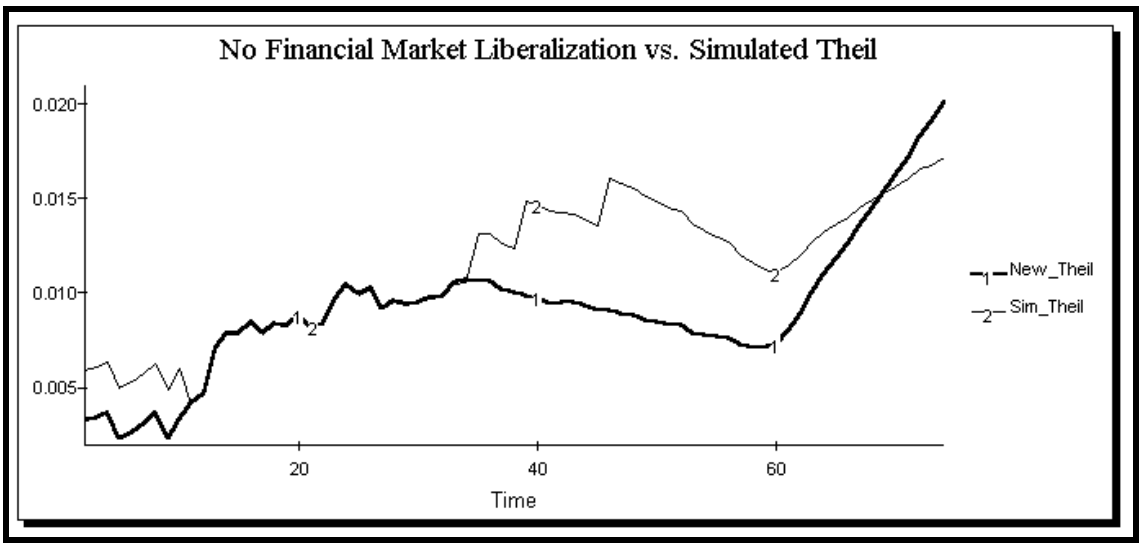

Diagram 6: The impact of no capital market liberalization (New_Theil) versus the simulation using historical capital market liberalization values (Sim_Theil).

with the arguments forwarded by Grabel. However, in 1994:3 (observation 58), the slope of the Theil shifts from negative to positive. The historically-based Theil does the same around this time, but its slope is smaller. Hence, in 1997:1 (observation 68), the new Theil crosses above the other, and appears to be well on its way to even higher levels as the time period ends. This does **not** fit with Grabel's hypothesis.

What appears to happen is the following. First, as one would expect, portfolio capital inflows fall steadily behind the historically-based simulation level, as does direct foreign investment. Though inflation and financial market volatility are lower, industrial production is, too. The last occurs primarily because construction activity is off (given the fall in portfolio investment funds available and the lack of direct foreign investment). Meanwhile, Mexican trade

liberalization goes on as planned in 1988:1 (observation 32), and exports are further boosted by the lower level of Mexican inflation and a slightly cheaper peso (both again due to the lack of inward portfolio investment). The key to understanding this scenario–and a factor not taken into account by Grabel–is the subsequent rise in the ratio of the rising exports to the falling industrial production. As suggested before, it has been argued that export sectors in developing countries are increasingly in competition with one another for simple, repetitive manufacturing jobs that low-skilled, low-waged labor can undertake. In the model used here, the lasting impact of the lack of capital market liberalization was a shift in Mexico's employment structure towards such jobs.

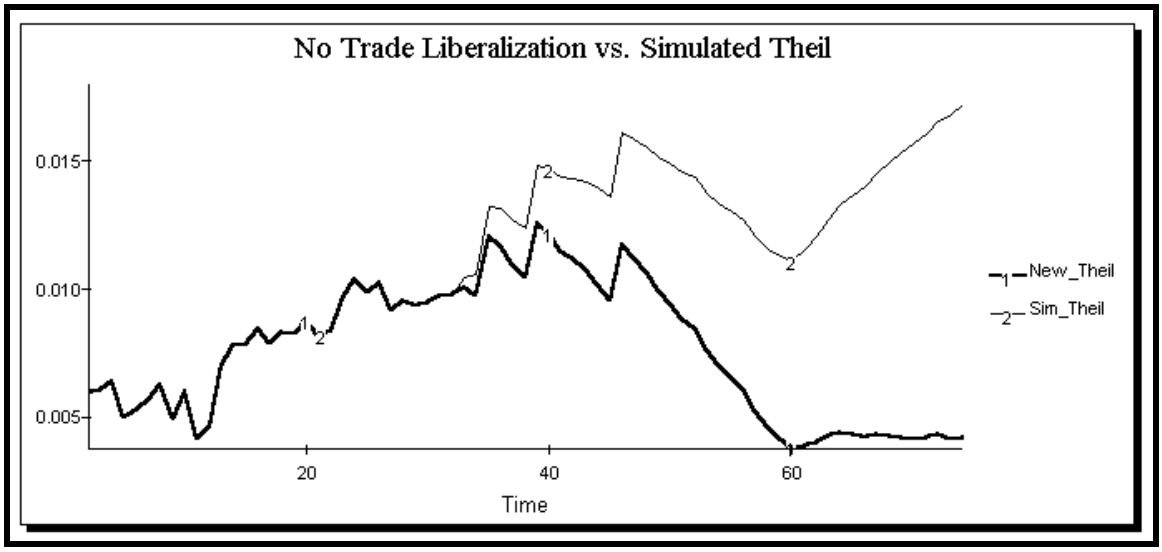

Diagram 7: The impact of no trade liberalization (New_Theil) versus the simulation using historical trade liberalization values (Sim_Theil).

This raises the question of what might have happened had the trade liberalization not taken place in 1988:1 (observation 32). Diagram 7 illustrates this scenario. Now, there is a large and dramatic decline in income inequality in Mexico, one that is due almost entirely to the

subsequent rise in manufacturing wages. Inflation and financial volatility are slightly higher, and direct foreign investment is lower, but the overall impact is still very clear–trade liberalization and the subsequent acceptance on Mexico's part of low-wage employment in that sector was a major factor in increased income inequality. Liberalization of capital flows were not.

4. Conclusions

Grabel's premise is that more harm than good is done when developing states decide to depend on portfolio investment flows for funding. As I suggested above, however, whether or not this conclusion is valid is an empirical question. More inflows of short-term capital cannot, ceteris paribus, be entirely bad. And yet the conditions that attract and are then created by such flows can be argued to have a negative impact on the host. But which effect is greater?

My conclusion is that the results are mixed, though there are compelling reasons to believe that Grabel is right. For Mexico over the time period studied, resisting capital market liberalization did for a time result in higher wages, more equal distributions of income, and (presumably) a shift toward instrumental valuing. However, once the export sector growth accelerated, all gains were lost, and then some. The question is whether this is a function of Grabel's original argument being flawed, or of ceteris paribus being violated.

I strongly suspect the latter. If we assume that the UNCTAD report is, indeed, correct in arguing that developing states with rising export sectors have been suffering due to competition for the limited number of low-wage manufacturing jobs available (UNCTAD 2002), then this goes a long way toward explaining the apparent failure of Grabel's hypothesis. Recall that the rising Theil in Diagram 6 was a function of the rising export ratio. Note that even with that

negative taken into account, income inequality in Mexico was lower or equal to the historically-based simulation for all but the last two years of the period studied. Hence, until 1997:1, even fighting against the declining wages of the rising export sector, the Mexican economy's performance was superior when there was no capital market liberalization. Grabel is vindicated.[9]

Still, I think the model constructed here suggests that there is a new and important factor that Institutionalist development economists must take into account (above and beyond indigenous issues and those suggested by Grabel). Though it would be wrong to say that they are unaware of the trends in export-sector wages, the size of the impact of the latter is surprising and noteworthy. At present and in the specific case of Mexico, it appears to be a more important explanation of income mal-distribution than capital market liberalization.

[9]The reader may wonder if I tried suspending both the trade and capital market liberalizations. I did, and found that under those circumstances Grabel's hypothesis came through loud and clear. I hesitate to present this result, however, as it violates my earlier warning against trying to change too much history in running the simulation. It is nevertheless instructive and consistent with what I conclude.

APPENDIX ONE

The following is a complete list of the final equations used in the model, shown in Powersim's format. The following is a key to the labels before each:

init = initialization value;
flow = subsequent changes over each time period (i.e., each dt, or delta time);
aux = auxiliary equation;
const = constant (note that these were not actually constant, but input via data files; the values shown for the constants are never read by the computer as it knows to retrieve them instead from the file).

init DFK = 19721.15
flow DFK = +dt*DFI

init Exports = 3.75
flow Exports = +dt*DExports

init FX = 0.022867
flow FX = +dt*DFX

init IndProd = 76.6
flow IndProd = +dt*DIndProd

init Inf = .125
flow Inf = +dt*D_Inf

init Interest = 20.23
flow Interest = +dt*DInt

init ManuWage = 11.35576
flow ManuWage = +dt*DManuWage

init MinWage = 125.73
flow MinWage = +dt*DMinWage

init PFK = 52271.586
flow PFK = +dt*PFI

aux D_Inf = 1*DInf

aux DExports = 0.4236179426 + 0.7616161866*DFX -0.4028612835*(DELAYMTR(Inf, 1,1,0)-DELAYMTR(USInf, 1,1,0)) + 0.1482662199*DELAYMTR(DUSECI, 1,1,0) - 0.04381232339*DELAYMTR(DManuWage, 1,2,0) - 0.009675869*TradeLib + 0.0001444786677*DRealOil - 30.41167165*ChinaMRatio + 0.8443237062*(DUSGDP/USGDP)

aux DFI = 8063.768+54.7457*DUSGDP-3499.1148*DELAYMTR(DManuWage, 1, 1, 0)+4980.575*DELAYMTR(FinLib,1,1,0)+9914.533*DELAYMTR(DFX,1,1,0)

aux DFX = FX_Policy*1

aux DIndProd = 0.1+0.06369*DFiscStim+0.30217*DConst+0.936528*DExports-4.571321*LIMIT(CVFX, 0, 1)

aux DInt = 0.37925-0.0000171403*PFI+43.55742*D_Inf

aux DManuWage = -0.03768057989 +0.05455861834*DIndProd + 0.3083453584*Pacto + .0000003873459374*(DFK*TradeLib) + 0.02934270885*DELAYMTR(DMinWage, 1,1,0) - 6*(XIndex*TradeLib) - 1.5*Austerity

aux DMinWage = MinWagePolicy*1

aux PFI = -10000 + 4097.306846*(FinLib^2) - 149181.374*LIMIT(CVFX, 0, 1) - 63913.21274*DFX + 175.3751198*(Interest-USInt) + 12972.44262*Pacto + 4916.133139*DIndProd

aux CVFX = -0.09458801835 - 0.005922252437*DELAYMTR(DIndProd, 1,1,0) + .00000001424783587*PFK + 0.1539076644*Inf + 0.09891146129*(Overval^2)+0.08667137399*LoanDefault

aux DConst = 0.6071011852+ .00001958030106*DELAYMTR(PFI,1,1,0)-0.07562*DELAYMTR(DInt, 1,1,0)-4.65009*DFX +0.000027847*DFI+0.2299829782*DFiscStim-22.27025905*LIMIT(CVFX, 0, 1)

aux DInf = 0.002*ManuWage- 0.008325*DRealInt+0.1*DFX/FX-0.6*DPacto-.05*Pacto

aux Overval = DFX/FX-Inf+USInf

aux Theil = 0.02437-0.00185*ManuWage+0.00267*FinLib+0.001247*Quake

aux XIndex = Exports/IndProd

const Austerity = 3

```
const   ChinaMRatio = 2
const   DFiscStim = 2.25255
const   DPacto = 0
const   DRealInt = 6.554090949
const   DRealOil = 200.278
const   DUSECI = 2
const   DUSGDP = 12
const   FinLib = 1
const   FX_Policy = 0.00006667
const   LoanDefault = 3
const   MinWagePolicy = 125.7298
const   Pacto = 0
const   Quake = 0
const   TradeLib = 0
const   USGDP = 0.0020615
const   USInf = 2
const   USInt = 5
```

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